

2.1

Using a Scientific Model to Predict Speed



Question: Can you predict the speed of the car at any point on the ramp?

A Finding the speed of the car at different points along the ramp

1. Select between 5 and 10 locations along the ramp to measure the speed of the car. The places should be at regular intervals such as every 10.0 centimeters.
2. At each location record the position of the photogate and the time through the light beam in the table. The distance traveled will be the same for every position since it is the width of the wing.
3. Calculate the speed of the car using the car wing length (5.00 cm) and the time measurement. Record this value in the table below.

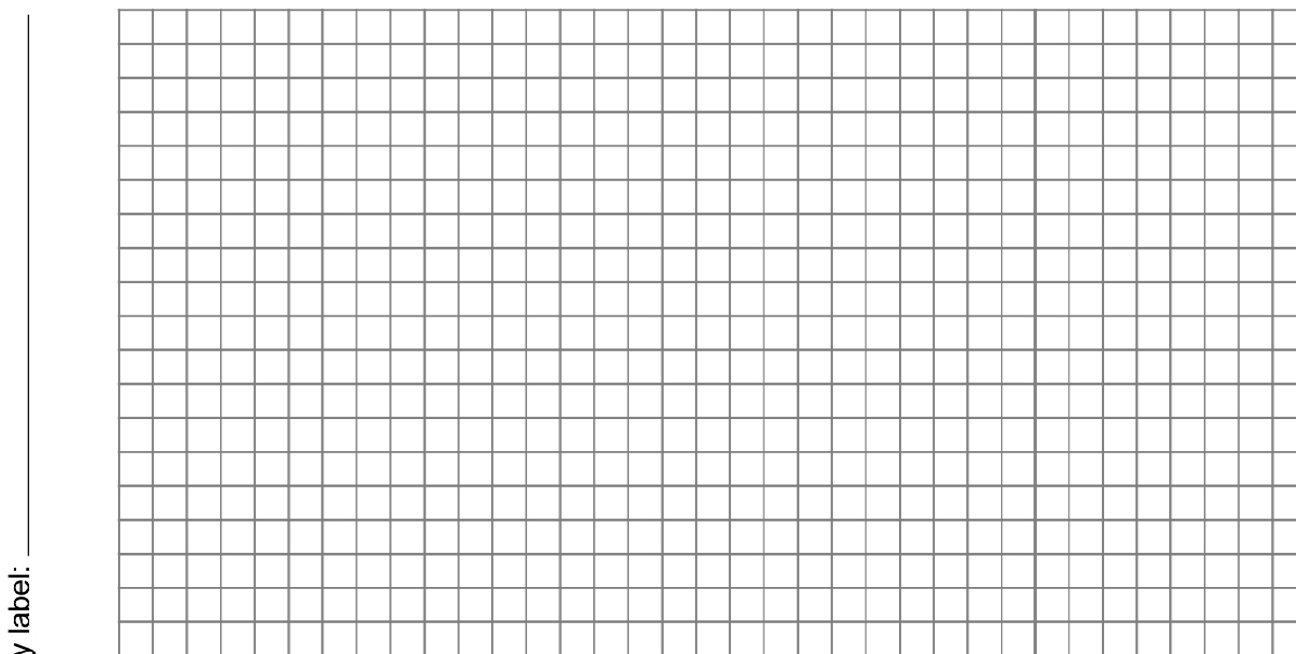
Position of photogate A (cm) from top of ramp	Time from photogate A (sec)	Distance traveled by car (cm) Wing width (5.00cm)	Speed of the car (cm/sec)

B Graphing and analyzing your results

- a. Do you notice a trend in your measurements? How does the speed of the car change as it moves down the ramp?

- b. Graph the speed of the car vs. position. Place speed of the car on the y -axis and position of photogate A on the x -axis. Add labels to each axis and title the graph.

Title: _____



- c. What does the graph show about the speed of the car?

C Using your graph to predict the speed of the car

a. Choose a spot on the ramp where you did not measure the speed of the car.

b. Use your graph to find the predicted speed of the car at that distance. Record your predicted speed.

c. Place the photogate at the distance you selected in step A and record the time it takes for the car to pass through the photogate.

d. Use the wing length (5.00 cm) and the time to calculate the speed. Record the actual speed.

e. How does the predicted speed compare with the actual measured speed? What does this tell you about your experiment and measurements?

D Calculating percent error

- a. Find the difference between the predicted speed and the actual, calculated speed. $\text{Predicted speed} - \text{Actual speed} = \text{Difference}$

- b. Take this difference and divide it by the predicted speed, then multiply by 100.
 $(\text{Difference divided by Predicted speed}) \times 100 = \text{Percent error}$

- c. Use the percent error to calculate percent correct.
 $100 - \text{Percent error} = \text{Percent correct}$
